

EPTATRETUS CARIBBEAUS: A NEW SPECIES OF HAGFISH
(MYXINIDAE) FROM THE CARIBBEAN

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ABSTRACT

In a continuing revision of the genus *Eptatretus* from the western Atlantic five specimens from the continental slope (365 to 500 m) of the western Caribbean represent a new species, described herein as *Eptatretus caribbeaus*. This seven-gilled species is compared with its Atlantic congeners as well as with *Eptatretus cirrhatus*, the only previously named seven-gilled species of *Eptatretus*, for which some new data are given.

In a previous report (Fernholm and Hubbs, 1981) dealing with species of *Eptatretus* occurring in the western Atlantic, a new species, *E. multidentis* was described. Two specimens that differed in important respects from *E. multidentis* were, nevertheless, referred to *E. multidentis*? by us, to indicate their close relationship to that species. It was, however, believed that if more specimens became available it might be necessary to refer them to a new species.

Eight more *Eptatretus* specimens have now been made available from Florida State Museum, Gainesville. Of these, three are identified as *E. springeri* (Bigelow and Schroeder) and two as *E. minor* Fernholm and Hubbs (1981), while the remaining three were found to be conspecific with the two specimens earlier referred to as *E. multidentis*?. Two specimens of *E. springeri* (UF 27898, 29°03'N, 87°12'W, 18 September 1973) and one specimen of *E. minor* (UF 27896, 29°26'N, 87°12'W, 14 September 1973) were caught at the same depth (400 m) thus indicating an overlap in depth distribution at about 400 m. Otherwise, data from these specimens of *E. springeri* and *E. minor* in all respects confirm earlier knowledge (Bigelow and Schroeder, 1952, Fernholm and Hubbs, 1981).

The two specimens earlier referred to as *E. multidentis*? (Fernholm and Hubbs, 1981) and the three new specimens are described herein as *Eptatretus caribbeaus* n. sp.

Key to the Western Atlantic Species of *Eptatretus*
(Modified from Fernholm and Hubbs, 1981)

- 1a. Three anterior teeth in outer row and two anterior teeth in inner row fused at bases 2
- 1b. Three anterior teeth in each row fused at bases 4
- 2a. Gill apertures 6 or 7. Body and head stout 3
- 2b. Gill apertures 5. Body thin. Head narrow. One specimen, 308 mm. South of the Bahamas ..
..... sp. B
- 3a. Slime pores 84-92. Maximum known length 590 mm. Northeastern Gulf of Mexico .. *springeri*
- 3b. Slime pores 78. One specimen, 433 mm. North of the Bahamas sp. A
- 4a. Gill apertures 7 *caribbeaus*
- 4b. Gill apertures 6 (rarely 5) 5
- 5a. A thin whitish middorsal stripe. Total cusp count of teeth 46-54. Maximum known size 395 mm. Northeastern Gulf of Mexico *minor*
- 5b. No whitish middorsal stripe. Total cusp count of teeth 52-58. Caribbean Sea and Atlantic Ocean off French Guiana and Haiti 6
- 6a. Slime pores 75. Total cusp count of teeth 58. One specimen 380 mm. North of Haiti sp. C
- 6b. Slime pores 87-91. Total cusp count of teeth 52-57. Maximum known length 655 mm. Caribbean Sea and Atlantic Ocean off French Guiana *multidentis*

MATERIAL AND METHODS

The following abbreviations are used: MCZ—Museum of Comparative Zoology, Harvard University, Cambridge; UF—Florida State Museum, University of Florida, Gainesville; USNM—National Museum of Natural History, Washington, D.C.

About 40 uncatalogued, fresh and preserved, specimens of *E. cirrhatus* caught in 40 m depth off Kaikoura, S. Island, New Zealand, were studied by the author at a visit to the Edward Percival Marine Laboratory, New Zealand in 1973.

Counts and measurements were made in the same manner as in Fernholm and Hubbs (1981). Gill pouches were counted through a midventral cut in the branchial area. Counting of teeth was simplified by making another midventral cut in the mouth to expose the tooth-plates. Total cusp count was obtained by adding the number of cusps on multicuspid to the number of unicuspid (including the smaller ones) on both the inner and outer tooth rows on both the left and right tooth plate.

Eptatretus caribbeus new species

Table 1

E. multidentis?.—Fernholm and Hubbs, 1981 (USNM 218405 and MCZ 40409, Fig. 9, described and compared to *E. multidentis*).

Holotype.—MCZ 40409, 331 mm TL, sexually immature female caught in bottom trawl, 23 August 1957, Oregon station 1886, 16°55'N, 81°12'W, depth 500 m, bottom type gray clay.

Paratypes.—USNM 218405, 364 mm, formerly Department of Biology, University of Panama, No. 523, caught in bottom trawl, 5 July 1972 by the chartered commercial trawler CANOPUS between Nicaragua and the Columbian border, depth 365 m; UF 27892, 385 mm, no data; UF 27894, 345 mm, caught in bottom trawl, 21 May 1962, Oregon Station 3570, Caribbean Sea off Nicaragua, 14°08'N, 81°55'W, depth 365–440 m; UF 27895, 364 mm, caught in bottom trawl, 7 June 1962, Oregon station 3627, Caribbean Sea off Honduras, 16°50'N, 81°21'W, depth 365 m.

Name.—The specific name of *E. caribbeus* refers to the region of its occurrence.

Diagnosis.—A seven-gilled species of *Eptatretus* with 14–16 cusps in the outer tooth row and 13–14 in the inner, the first three cusps in each row being fused at bases, giving a total cusp count of 54–58. Total slime pores on the left side 79–85.

Description.—Body cylindrical throughout most of its length, its diameter about 5–7% of total length, tapering rearward, laterally compressed behind the cloaca forming a flaring tail; total length of studied specimens 33–39 cm; a segmentally arranged row of slime pores low on each side, extending from behind the head to beyond the cloaca, 13–15 pores in front of the gill apertures, 6 or 7 just ventrally to the gill apertures, 47–52 between the gill apertures and cloaca, and 11–13 overlying and posterior to cloaca.

Prebranchial length from snout to gill apertures 21–24% of total length, branchial length from front of first gill aperture on the left side to front of the pharyngocutaneous duct opening 6–8%, trunk length from front of pharyngocutaneous duct opening to front of cloacal split 50–56%, and tail from front of cloacal split to posterior tip of caudal fin 17–20%; rostrum overlying single nostril; 2 pairs of slender flexible barbels flanking either side of nostril, with a third somewhat longer pair and a lateral pair of small ventrocaudally-pointed, conical projections flanking the mouth; mouth without lips; seven gill apertures on each side, correspond to seven pairs of internal gill pouches, the posteriormost on the left side having a common opening with the pharyngocutaneous duct.

All the preserved specimens are a light to very light tan over the whole body; only one (UF 27892) has a lighter coloration ventrally and well discernible lighter eyespots.

Lingual teeth orange and comb-like, with sharp tips slightly curved rearward, close together, with longest teeth in the middle of each row decreasing in length to both sides; those of outer series larger than those of inner series and partially

Table 1. Characters of *Eptatretus caribbeus* n. sp. and compared congeners; mean, SD (in parentheses) and range given for multiple specimens

Depth of Capture (m)	<i>E. caribbeus</i> n. sp.		Holotype 500	<i>E. cirrhatus</i> 10 Specimens		<i>E. multidentis</i> 4 Specimens		<i>E. sp. A</i> 950	<i>E. sp. C</i> 910
	365-500	Incl. holotype		40	510-770				
Total length TL (mm)	358 (20.6)	331-385	331	720 (73.5)	560-830	526 (125.3)	377-655	433	380
Weight (g)	113 (40.2)	79-177	84	855 (266)	345-1,250	494 (302.1)	164-757	182	154
Measurements in thousandths of TL:									
Preocular length	59	56-61	—	56 (3.7)	49-61	46 (3.1)	43-49	53	59
Prebranchial length	223 (8.1)	214-236	214	222 (7.8)	205-229	200 (8.4)	188-207	215	237
Branchial length	69 (8.0)	58-78	73	81 (5.2)	72-87	65 (4.0)	61-69	79	47
Trunk length	532 (22.2)	504-560	517	547 (13.7)	522-577	560 (8.0)	552-571	550	526
Tail length	180 (11.1)	165-196	196	150 (12.7)	133-179	179 (8.0)	169-188	157	190
Body width	56 (12.0)	48-77	48	56 (3.7)	49-61	45 (5.7)	39-50	55	57
Body depth									
incl. finfold	97 (19.0)	77-114	97	94 (11.5)	75-110	104 (16.0)	80-115	88	100
excl. finfold	93 (13.9)	74-106	—	94 (11.5)	75-110	102 (16.0)	78-113	85	99
over cloaca	77 (10.2)	69-92	69	72 (6.6)	61-85	72 (8.8)	60-81	74	84
Tail depth	96 (13.8)	75-109	97	87 (10.1)	70-100	76 (8.7)	66-86	81	79
Barbel length									
first	13 (2.1)	11-16	14	—	—	12 (3.4)	8-15	15	13
second	15 (2.5)	17-24	19	—	—	14 (0.6)	13-14	16	14
third	20 (2.9)	17-24	21	—	—	18 (2.3)	15-20	16	21
Counts:									
Teeth									
Cusps on multicusps	3/3		3/3	3/3		3/3		3/2	3/3
Unicusps, outer row*		11-13	11 + 12		8-9		11-12	10 + 11	12 + 12
Unicusps, inner row*		10-11	10 + 11		8-9		9-11	10 + 10	11 + 11
Total sum of cusps	56 (1.6)	54-58	56	47 (1.3)	44-48	55 (2.4)	52-57	51	58
Slime pores, left side									
Prebranchial	14 (0.9)	13-15	13	16 (0.8)	15-17	15 (1.0)	14-16	14	13
Branchial	6.0 (0.0)	6-6	6	7.0 (0.0)	7-7	5.5 (0.6)	5-6	4	4
Trunk	50 (1.9)	47-52	50	52 (1.8)	50-57	54 (1.5)	52-55	48	44
Tail	12.4 (0.9)	11-13	12	13.3 (0.7)	12-14	15 (0.0)	15-15	13	14
Total sum	82 (2.3)	79-85	81	88 (1.5)	86-90	89 (1.8)	87-91	79	75
Gill apertures, both sides*	14 (0.0)	14-14	7 + 7	14 (0.0)	14-14	12 (0.0)	12-12	7 + 7	6 + 6

* Left + right count for single specimen.

overlapping the latter when tongue is retracted within mouth 11–13 unicusps on either side in the outer row and 10–11 in the inner rows; each row starts with a multicuspid tooth made up of 3 fused unicusps.

The single, low, ventral finfold originates about midway between the last gill apertures and the cloaca and continues backward to just in front of the cloaca.

All five specimens appear to be sexually immature.

Comparison with Other Species

Only one seven-gilled eptatretid species has so far been named, the Australian-New Zealand *E. cirrhatus*, but it should be noted that three more Pacific, seven-gilled species of *Eptatretus* are being studied at Scripps Institution of Oceanography (R. Wisner, pers. comm.)

Strahan (1975) gave some data for *E. cirrhatus* and a key to the 5–7 gilled *Eptatretus*. Using the morphometric characters in that key, *E. caribbeaus* keys out with *E. cirrhatus*. However, a detailed analysis of the data presented in Table 1 clearly shows the differences between the two species, the most important being the non-overlapping counts of slime pores and teeth. Also, the tail length is significantly ($P < 0.01$, t-test) longer in the Atlantic species.

The single Atlantic specimen from north of Grand Bahama Island referred to and described as *E. sp. A* in Fernholm and Hubbs (1981) also has seven gills, but because the pattern of fused teeth is 3/2, it cannot be referred to *E. caribbeaus*, in which the pattern is 3/3. Other differences are a more flaring (deeper) tail in *E. caribbeaus* and a different pattern of main branching of the ventral aorta. In *E. caribbeaus* the branching occurs at the level of the last (seventh) gill pouch, before any lateral branches have been given off to the gill pouches; in *E. sp. A* the branching occurs at the level of the fifth gill pouch after the afferent branches to gill pouches 7 and 6 have branched off from the aorta.

E. springeri and *E. sp. B* (described in Fernholm and Hubbs, 1981) have the pattern of fused teeth 3/2 and 6 or 5 pairs of gills and thus are distinct from *E. caribbeaus*.

E. minor from the northeastern Gulf of Mexico and *E. sp. C* from north of Haiti (described in Fernholm and Hubbs, 1981) are similar to *E. caribbeaus* in having the same pattern of fused teeth. The most clear difference is in the number of gills *E. minor* and *E. sp. C* having only 6 pairs of gills. *E. minor* also has fewer teeth than *E. caribbeaus*.

Comparison must also be made to the six-gilled *E. multidentis*, from off the north coast of South America, which is obviously closely related to *E. caribbeaus* in having the common pattern of fused teeth (3/3) and a similar high tooth count. Again, the main difference is the number of gills, which for eptatretids with low numbers of gill pouches (5–8) seems to be quite constant (no variation found in the 41 *E. cirrhatus* examined, Fernholm and Hubbs, 1981). Other significant differences are the longer prebranchial length and the deeper tail in *E. caribbeaus* ($P < 0.001$, interaction non significant, two-way analysis of variance, Sokal and Rohlf, 1969). *E. multidentis*, furthermore, seems to have a longer ventral finfold, which originates behind the last gill apertures at about $\frac{1}{3}$ of the way to the cloaca as compared to about midway in *E. caribbeaus*.

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